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ABSTRACT

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# A POSSIBLE NEW CAUSE OF TONE-SPLITTING--EVIDENCE FROM CAMA, YORUBA, AND OTHER LANGUAGES[1]

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## 1. Introduction

This paper will review the evidence that Proto-Niger-Congo was a tone language with only two level tones and seek to find the evidence that will explain how some of the descendant languages have more than two tones. In particular it will show how synchronic tone rules in Cama and consonant correspondences between Cama and Yoruba suggest a new factor in historical tone splitting--the difference between fortis and lenis articulation--may have been discovered.

## 2. Tone in Niger-Congo

A large majority of the present-day Niger-Congo languages have typologically similar two-level tone systems, some have more complex tone systems, and a few are non-tonal. Comparative studies show that not only may consonant types and vowel qualities be reconstructed but also that cross-language correspondences of tone can be demonstrated. Niger-Congo historical studies first reached maturity in the Narrow Bantu field. Although Meinhof [1899] and Bourquin [1923] did not reconstruct tonal distinctions in their 'Urbantu' word stems, Nekes [1911a] maintained, on the basis of correspondences between Yaunde and Shambala, that Proto-Bantu had a two-level tone system, and he extended his evidence to more languages in later papers [1911b, 1928]. Other scholars[2] have confirmed Nekes' conclusion. Comparative studies of other Niger-Congo subgroups also generally indicate a prior two-level system,[3] and wider comparisons

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[2]Including Hulstaert [1934], Greenberg [1948], Hoffmann [1952-3], Meeussen [1954], Guthrie [1967 ff], and Kähler-Meyer [1967-8].

[3]See for example Williamson [1965: 6] for Proto-Ijo and Proto-Lower-Niger [1973a: 5], Heine [1968] for Proto-Togo-Remnant, Stewart [1966] for Proto-Volta-Comoe, Dwyer [1973] for Proto-Southwestern-Mande (cf. also Welmers [1973]), Long [1971] for Proto-Northern-Mande, Elugbe [1974] for Proto-Edo, etc. On the other hand Proto-Yoruba-Igala, according to Williamson [n.d.] and Silverstein [1973], and Proto-Jukunoid according to Shimizu [1971] had three levels.



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show that the two levels correspond across the groups. The 'Proto-West Sudanic' forms of Westermann [1927] sometimes marked high or low tone, as do the reconstructions in Armstrong [1964] and the Benue-Congo Comparative Wordlist [Williamson and Shimizu 1968; Williamson 1973b]. Similarly Voorhoeve's Ekoid-Bamileke-Bantu 'pseudoreconstructions' [1967] and Cook's extension of these to Efik [1968], as well as de Wolf's phonological sketch of Proto-Benue-Congo [1971: 51] agree on an earlier two-level tone system. Stewart [1970], in some of the most careful work on comparative reconstruction in West Africa, shows that a two-level tone system must have existed in a construct that he calls 'Proto-Volta-Bantu', which is the latest common ancestor of:

(1) the Potou Lagoon languages Cama (Ebrie) and Mbato (cf. Dumestre [1971: 311]),
(2) the Volta-Comoe languages [Stewart 1966], and
(3) the Narrow Bantu languages, as represented by Guthrie's Common Bantu starred forms [1967 ff].

Stewart only compared these three language groups, but their latest common ancestor should also be the ancestor of a large number of Niger-Congo languages at present usually grouped under the labels Kwa and Benue-Congo [Greenberg 1963] but which I would prefer to label jointly Southern Niger-Congo as I share the doubts of many other scholars on the correctness of the division established between the supposed Kwa and Benue-Congo families.

## 3. Models for tone change

If Proto-Niger-Congo had only two tone levels, then the languages which currently have tone systems with more levels must have developed these from the earlier two-level system. We need to explain how a typological change could take place to alter the two-level system into one of three levels (as in Yoruba, Igala, Birom, Jukun, etc.) or of four levels (as in Igede, Toura, Ndoro, or the Nikki dialect of Bariba) or even of five levels (as in the Mbembe languages Ashuku and Kporo). Processes which result in the multiplication of the number of tones in a language are known as 'tone-splitting' processes. Three models have been put forward for this kind of change. They may for convenience be labelled the downdrift, sandhi, and phonation type models. I will examine these to seek the one that will explain why Yoruba has three tones.

a. The downdrift model. The 'downdrift model' suggests that differing pitch exponents for the same underlying tone level which arise as a result of the superimposition of intonational patterns, such as downdrift, can develop into new contrastive tone levels. In the course of the long debate over downstep [Stewart 1965; Armstrong 1968; Williamson 1970; etc.] it has often been suggested that languages like Akan provide a

possible model for tone-splitting.[4] Akan has downdrift, and synchronic rules that produce a high-downstepped-high sequence of tones when a low tone segment is deleted between two high tones (which differ in pitch because of downdrift). It also has a rare lexical downstepped high tone which probably arose historically from the loss of a low tone intervening between two high tones. A further spread of this phenomenon could yield a third tone of much wider distribution than the present (non-automatic) downstep tone in Akan. This third tone would presumably continue to show that it had arisen in positions following high tone only by showing a skewed distribution, so this model does not explain the derivation of a true mid tone, such as there is in Yoruba, that is not subject to such restrictions on its distribution. Dwyer [1973: 248-250] has suggested that Southwestern Mande did develop a third contrastive tone when the complementary distribution of mid and low phonetic levels in disyllabic nouns was 'spoiled' by the borrowing of low-low nouns from Northern Mande, and the distribution of the three tones does still largely reflect the earlier complementarity.

b. The sandhi model. In many languages an underlying tone has variant phonetic forms according to the tones which precede or follow. Tone sandhi rules are particularly well known from numerous Chinese dialects (for some examples see Wang [1967]). In many of the Chinese cases the phonetic motivation for the rule is obscure but we can imagine how a language with two basic tone levels but with a tendency for high tones to be somewhat lowered when a low tone follows and for low tones to be somewhat raised when a high tone follows could develop into a language with four levels of the conditioning environment was lost or absorbed. This is essentially the kind of process that is sketched for Fe?Fe? by Hyman [1972] and for Dschang by Tadadjeu [1974]. A merger of the raised low and lowered high tones into a mid tone could result in a three-level system evolving from an earlier two-level one. In Yoruba, however, there is evidence that the third tone arose because the original low tone split into low and mid variants, while the high tone was unperturbed. In Niger-Congo two-level languages the general pattern is for the high tone to dominate over the low (see Maddieson [1972], and Schachter [1969], Williamson [1972]). Because Yoruba high tone dominates over both low and mid tones we may assume that the original high is preserved as Yoruba high. Stahlke [1972] has presented other evidence from internal reconstruction, including the relative frequency of tones on monosyllabic verbs, that confirm the original identity of low and mid tones. While I

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[4]Stewart [1971] has more recently proposed that the three-level system seen in Yoruba is more conservative than the two-level plus downstep system of languages like Akan. On this reading the downstep tone is the remnant of the formerly more widely distributed mid tone. The mechanism by which this is achieved is complex, and the proposal seems to ignore the much greater frequency and wider distribution geographically of the two-level system.

think it is probable that some of the mid tones derive from earlier high-low or low-high sequences, there does not seem to be the comparative or internal evidence to sustain this explanation for them all.

c. The 'phonation type' model. In many languages there are contextual modifications of pitch which depend on the manner of articulation of surrounding consonants, often the glottal state or phonation type being the crucial factor. Such contextual modification can become the basis for the restructuring of a tone system--as was already known to philologists in the time of the T'ang dynasty in China. Traditional Chinese philology distinguished yin and yang descendants of tones from an earlier simpler tonal system. The split into a higher (yin) and lower (yang) variety depended on the initial consonant. Recently the question of consonant influence on tone has attracted sufficient interest for a conference to be devoted specifically to the subject [Hyman 1973]. Various contrasts of phonation types or manners of articulation have been claimed or demonstrated to have a historical splitting effect on tones or to introduce tonal contrasts to a language that previously lacked them. The most widely discussed is the distinction between voicing and voicelessness, especially in obstruents. Lea [1972, 1973] and others (e.g. Chistovitch [1969], Haggard, Ambler and Callow [1970]) have shown that nondistinctive pitch differences in vowels occur in languages like English and Russian following voiceless obstruents, voiced obstruents, and sonorants and these can be important perceptual clues to the recognition of the nature of the preceding consonant. Where lower pitch at the beginning of the vowel or a lower tone reflex occurs following (originally) voiced obstruents as in present-day English and in the historical development of some Chinese dialects (e.g. Cantonese, Taishan [Cheng 1973]), southwestern Tai dialects [Brown 1965], in ten of thirteen Loloish languages [Matisoff 1972] and Cham in the Malayan-Indonesian group of languages [Haudricourt 1972: 61; Blood 1964: 516 fn. 5] to mention only a few, it may be that the supraglottal obstruction causes a reduction in transglottal pressure and airflow through the glottis is slowed, consequently the rate of vocal cord vibration is reduced (cf. Lea [1973]). Ladefoged [1972: 74] remarks that "the rate of flow of air depends in part on the subglottal pressure ... But it is also partially dependent on the position of the vocal cords themselves. When the glottis is spread open there is obviously a potentially higher rate of flow than when it is narrowed." These complementary explanations suggest why voiceless sounds may be followed by higher pitch and why voiced obstruents may be followed by a depressed pitch, with perhaps voiced sonorants forming a third intermediate class (cf. the situation in Ewe, Ansre [1961]). However about an equal number of cases of the reverse historical correlation can be found, of voicing with higher pitch and voicelessness with lower pitch--for example in Sui [Haudricourt 1972: 68-9], the central branch of the Tai family [Brown 1965; Sarawit 1973], many of the Northern Tai languages, Nasu and Lü-Ch'üan among the Loloish languages, Chaochow and Shaowu among the Min Chinese dialects [Norman 1973], etc. There are also many individual languages that show both of these develop-

ments, giving both correlations in differing environments (e.g. the Po-Pei dialect of Chinese, which has the first with tone A or C but the second with tone B . We will return to this reverse correlation of tone with voicing later, after considering the earlier history of Southern Niger-Congo consonantism.

## 4. Fortis/lenis contrast in Southern Niger-Congo

In Yoruba, unlike standard Ewe [Ansre 1961; Stahlke 1971], there are few if any clues in a present-day correlation of classes of consonants and different tones to help in the reconstruction of earlier tonal facts. All consonants precede or follow all tones. If there is a connection between tone and consonant type in Yoruba, it must lie in some feature which has lost its distinctive value (through merger, shift, etc.) in the course of the evolution of the language. The consonant system of modern 'standard' or 'Common' Yoruba is a fairly simple one (if one ignores recent 'educated' loans) and some degree of simplification looks inherently probable. It contains only 17 consonants and no clusters are permitted. The consonants are as follows:

| | | | | | |
|---|---|---|---|---|---|
| voiceless stops | | t | č | k | kp |
| voiced stops | b | d | ǰ | g | gb |
| vl continuants | f | s | ʃ | h | |
| vd continuants | m | l | y | | w |

Yoruba lacks the distinction between 'fortis' and 'lenis' articulations which is probably to be reconstructed for the latest common ancestor of Southern Niger-Congo. Evidence of a widespread distinction between fortis and lenis consonants can be found in the Potou Lagoon languages ('Western Kwa'), in languages of the Edo group ('Eastern Kwa'--see Laver [1967]; Elgube [1974]; Ladefoged [1974], etc.) and in the Cross River 3 languages (these are the Upper Cross group of the Delta-Cross Division of Cross River according to Cook's classification and include Mbembe, Ufia, and Agbo [Bendor-Samuel and Spreda 1969], KoHumono [Cook 1969], and Kukele. Less clearly visible traces remain in the Lower Niger group in Ẹkpeyẹ [Clark 1971; Williamson 1973: 14-15], in Ijo, and elsewhere. Cama is one of the languages which has a four-way contrast among stops at the same place of articulation; voiced fortis, voiced lenis, voiceless fortis, and voiceless lenis.

Stewart [1970: 3] remarks that "the articulatory nature of the lenis feature has not been precisely determined by instrumental means, but it appears to consist in the absence of the heightened oral cavity pressure which, in other languages, commonly occurs as a redundant feature of obstruents". Among the voiceless stops the lenis set lack aspiration (cf.

Kim [1965]). The voiced lenis stops have been characterised an 'implosive' but they are not truly so; rather they are more like nasals, which typically lack a build-up of pressure in the oral cavity because of the nasal escape. They seem easily to pass into nasals and to be perceptually close to them--compare the description of similar voiced stops in East London speech in Beaken [1971]. Williamson describes the so-called 'implosives' of Ekpeye as 'semi-sonorants' and the conception of these sounds as intermediate between the normal stops (fortis) and sonorants seems appropriate. Elugbe has data on similar sounds from Okpamheri which show that the lenis stops are shorter in duration than corresponding fortis ones and that in, for example, an alveolar place of articulation the area of contact of the articulators during the closure is smaller. This difference between fortis and lenis stops is constant for both the voiced and voiceless sets.

Obviously one might describe the differences between the stops in Cama in terms of four distinct types rather than insisting on two paired oppositions, voiced/voiceless and fortis/lenis. Stewart protests that this would "obscure...the situation in the language as a whole," but he does not give any examples of how this is true. However, there are a number of cases in the history of the languages which share this distinction which require that the lenis voiced stops (the 'implosives') and the unaspirated voiceless stops be classed together as members of of the same natural class. For example, in Mbato it is these two sets which have merged in the process of reduction of the four-way contrast to a three-way contrast.

In Cama the fortis feature is involved in the tone rules. Final low tone glides downwards. In disyllabic nouns (which invariably have a high tone prefix) the second tone is raised if it is an underlying low but it retains the downglide, which becomes superficially distinctive. This raising occurs regardless of the nature of the intervening consonant. Thus a four-way superficial distinction of pitch is produced. The following examples from Stewart illustrate his analysis:

| Gloss | I. Underlying | II. Downglide | III. Low Raising | IV. Lowering | V. Phonetic Transcription |
|---|---|---|---|---|---|
| 'grass' | ábḭ | ábḭ˕ | ábḭ˕ | ábḭ˕ | [ábī] [¯ ˥] |
| 'drum' | ábḭ | ábḭ˕ | ábḭ˕ | -- | [áb↑] [¯ ˥] |
| 'water' | ǽdú | -- | -- | ǽdù | [ǽdù] [¯ ˍ] |
| 'tongue' | áɖé | -- | -- | -- | [áɪé] [¯ ¯] |

Naturally one could take the view that the lowering of tones after fortis voiced consonants only affected high tones and that the consonant acted to inhibit the raising of low shown in III rather than having this low tone be just raised and then lowered. In either case the mechanism whereby a tone-split could emerge can be seen, lower varieties of both high (level) and low (falling) tones occurring after the voiced fortis stops. A rule of tonal depressing following fortis consonants has also been reported for Kukele [Fajen 1970]. Explanations and conjectures about why fortisness should depress tone will be deferred until the final section of the paper.

## 5. Cama-Yoruba correspondences

The Cama data suggests that the fortis/lenis distinction may have contributed to the splitting of the Yoruba low tone before loss or merger of consonants resulted in the reduced Yoruba consonant inventory. I searched for regular phonetic correspondences in an attempt to confirm this hypothesis. Unfortunately few items are available in published or other form in those languages which have a thorough-going fortis/lenis distinction. Much of what is available does not carry tone marks or has an imperfectly worked-out tone system. Cama items can be found in Vogler [1968], Dumestre [1970, 1971], and Stewart [1970], but although other lists can help to establish the correspondences between consonants, only Stewart's fully tone-marked list and, with some reservations, a list supplied by Stewart at an early stage in his analysis to Ladefoged in 1962 can testify to tonal correspondences. However, we can observe the distribution of tones in Yoruba in relation to the consonants for which correspondences can be found. Yoruba items have mostly been sought in the dictionaries of Abraham [1958] and Delano [1969] and in Fresco's dialect study [1970].

a. Cama lenis voiced stops. Following Stewart, subdotted letters will be used for the lenis stops in phonological transcriptions. The lenis voiced bilabial stop /ḅ/ has a nasal variant, [m], in a nasal environment, but elsewhere is [β]. A reasonable number of good correspondences suggest that Cama /ḅ/ corresponds with a Yoruba /w/ except before a Yoruba nasal vowel when the correspondence is /ḅ/ : /m/ :

| Cama item | gloss | phonetic | Yoruba | gloss |
|---|---|---|---|---|
| ã́ḅú | 'arm' | [m̃mṍ] | ọwọ́ | 'hand' |
| ḅá | 'come' | [βá] | wá | 'come' |
| ḅo | 'take' | [βo] | mú | 'take, grasp, etc.' |
| ḅu | 'cut down' | [βu] | wo | 'coliapse, demolish, fall' |
| aḅi | 'excrement' | [aβi] | imí * | 'faeces' |
| ḅi | | [βi] | | |

(*In Ondo, Okitipupa, Oba: [iwĩ́])

One possible correspondence suggests /ɓ/ : /f/ :

| | | | | |
|---|---|---|---|---|
| ɓo | 'break' | [ɓo] | fọ́ | 'break into pieces' |

This would appear to be homophonous in Cama with the word meaning 'take', but it has a different reflex in Yoruba. Perhaps there was some additional distinction in the antecedants of these two words.

For Stewart the lenis voiced alveolar stop /ɖ/ is "a purely theoretical base form" as, in the dialect he investigated, "it is replaced with [n] if it is before or after a [+nasal] vowel, and with [l] otherwise". Dumestre [1970, 1971] shows that there are dialects in which a [ɗ] pronunciation actually occurs in non-nasal environments.

The /ɖ/ in Cama corresponds most frequently to a Yoruba /l/ but sometimes corresponds with /r/ :

| Cama item | gloss | phonetic | Yoruba | gloss |
|---|---|---|---|---|
| ɖá ã̀ɖá aɖa | 'sleep' | [lá ńná] [ala] | lá | 'dream' |
| ɖò | 'go' | [lò] | lọ | 'go' |
| ɖù | 'repair, sew' | [lù] | lu | 'pierce' used with abẹ́rẹ́ 'needle' |
| ãɖu | 'mushroom' | [nnu] | olú | 'any mushroom or fungus' |
| ãɖuɖu | 'dust' | [nnuɗu] | ẹ̀ẹ́rú | 'dust, ash' |
| ã́ɖű́ | 'palm oil' | [ńnő] | ẹrú | 'palm oil' |
| ã́ɖá́ | 'animal' | [ńnã́] | ẹran | 'animal, meat' |

Before an high front oral vowel the correspondence is /ɖ/ : /j/ :

| | | | | |
|---|---|---|---|---|
| ɖí | 'eat' | [lí] | jẹ | 'eat' |

Note that no *lí, *li, or *lì exists in Yoruba. The vowel correspondence i:e here suggests the possibility that the Yoruba form had a suffix which merged with the stem vowel; viz. jíà > jẹ. One aberrant correspondence is the following:

| | | | | |
|---|---|---|---|---|
| ɓɖé | 'tongue' | [ɓlé] | èdè | 'language' |

If these are truly corresponding forms then an unusual shift of lenis to fortis must have occurred in the Yoruba form.

b. Cama voiced fortis stops. Cama /ɓ/ seemed difficult to match as words which were cognate could not easily be found. It seems probable

that /b/ corresponds with Yoruba /b/ if the following are in fact good cognates:

| Cama item | gloss | phonetic | Yoruba | gloss |
|---|---|---|---|---|
| bɜ̃ | 'be rotten' | [bɜ̀̃] | bu | 'go mouldy' |
| be | 'belch' | [bè] | bì | 'vomit' |

Similarly Cama /d/ seems to correspond to Yoruba /d/:

| | | | | |
|---|---|---|---|---|
| ǎ̀dú | 'water' | [ǹdù] | odò | 'river' |
| adu-ɓɛ | 'river' | [adu-ɓɛ] | " | " |
| ada | 'bat' | [ada] | àdọ́n | 'fruitbat' |
| di | 'arrive, come out, come down' | [di] | dé | 'arrive' |
| dr̃ɛ̃ | 'resound' | [dr̃ɛ̃] | dún | 'sound' |

Perhaps a second series of correspondences is suggested by:

| | | | | |
|---|---|---|---|---|
| du | 'snake' | [du] | ejò | 'snake' |
| adudu | 'rainy season' | [adudu] | òjò | 'rain' |

The /d/ : /j/ correspondence here might be restricted to cases where a high back vowel had originally followed */d/. If so, it is not clear why Cama ndu ~ adu corresponds with odò; perhaps it should be paired with òjò. An aberrant correspondence seems to be

| | | | | |
|---|---|---|---|---|
| dò | 'forge' | [dò] | rọ | 'forge' |

We may summarize the probable correspondences between the voiced fortis and lenis consonants in Cama and Yoruba segments by saying that, in general, the fortis ones correspond with voiced stops in Yoruba and the lenis ones correspond with sonorants.

c. Cama voiceless stops. Cama fortis voiceless stops clearly correspond with Yoruba voiceless stops, but the lenis ones proved difficult to find cognates for. One etymology, 'foot', seems to suggest that Cama lenis

/ṭ/ corresponds with Yoruba /s/.[5]

Given that the number of segmental correspondences is sufficient for us to have confidence in them (and, considering the meager sample of Cama available for comparison, the number is quite impressive and includes a number of very widely-attested Niger-Congo roots), we can consider the correlation of consonant type and tone.[6] An interesting fact emerges: all the Yoruba forms cognate with Cama forms having a lenis consonant show either high or mid tone after it and not low tone, with the exception of the aberrant form èdè, which of course has a consonant which normally corresponds to a fortis consonant in Cama. Similarly the Yoruba forms cognate with Cama forms having a fortis consonant show either a high or a low tone and not mid tone, except for the aberrant examples of the mid-tone verb ro, which has a consonant that would normally correspond with a lenis consonant in Cama. There is one further exception here; the verb bu 'go mouldy'

In the smaller number of cases for which there is full tonal data and direct correspondence of tone can be investigated, we find that, with the lenis consonants, Cama high tone corresponds with Yoruba high tone four times, and Cama low tone corresponds with Yoruba mid tone twice. Twice also Cama high tone corresponds with Yoruba mid tone, one of these cases being jẹ ( ? < ḍʃà). With the fortis consonants, we have evidence only for one tonal correspondence, which is of Cama high with Yoruba low (if the 'water, river' etymology is correct). These results show that there is a strong possibility that fortisness has acted historically as a depressor of tone.[7] Since this is so, it is worth considering the phonetic plausibility of such an effect.

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[5]The regular correspondence in Igala for Yoruba /s/ is the voiceless alveolar tap /ɽ/, while Yoruba /t/ corresponds with Igala /t/ [Silverstein 1973]. Obvoiusly a lenis voiceless alveolar stop and a voiceless alveolar tap are similar segments, and probably Igala is conservative in retaining /ɽ/ here rather than innovative as Silverstein suggests.

[6]Where we find voiced stops in Yoruba corresponding with voiced fortis stops in Cama, we also find voiced stops in Igala. Where Yoruba has /r/ ( < /d/) Igala has /l/. Among the Cama voiced lenis stops, /ḅ/ corresponds with Igala /w/ and occasionally /m/, and /ḍ/ corresponds with Igala /n/, confirming the similarity of these stops to nasals. Except among noun prefixes, where Igala has high tone when Yoruba has mid, tones in Yoruba and Igala coincide. We may therefore state that correlations of tone and consonant type that hold between Cama and Yoruba hold between Cama and Proto-Yoruba-Igala (including Itsekiri).

[7]Stewart [1972] has pointed out that the three groups of consonants that we need to distinguish in Ewe can be distinguished by dividing the voiced category into fortis and lenis groups, and has suggested that this division is also a trace of the earlier wider distribution of the fortis/lenis contrast in Niger-Congo and its interaction with tone.

## 6. Explanation of the phenomenon

Stewart [1970: 8] suggests that the differing effects on tone of the voiced fortis and lenis stops in Cama arise because the fortis stops do act in the way described by Lea (i.e. the supraglottal obstruction produces an equalization of the pressure drop across the glottis, with a consequent drop in the rate of air-flow through the glottis and therefore also a drop in pitch) but the lenis stops do not do so. He speculates that the heightened pressure in the oral cavity is avoided with the lenis stops "possibly by lowering the larynx, or by relaxing the walls of the oral cavity and allowing them to expand, or both". Since lowered larynx position and lowered pitch tend to correlate with each other [Vanderslice 1967], the larynx is probably not lowered, but Stewart is probably right in his suggestion that the walls of the oral cavity are not stiffened at all. In addition if the closure is held for a shorter duration and is a less extensive contact, then the opportunity for pressure to build up will not be there. Only if the articulation is 'fortis' (i.e. with stiffened cavity walls preventing expansion of the cavity size and with more extensive contact and/or longer duration) will voiced obstruents tend to depress pitch.

## 7. Wider relevance

The suggestion that differences in consonant tensity may be relevant for pitch variation has wider relevance than just for Southern Niger-Congo. [Norman 1973] has suggested a need to reconstruct a six-way contrast between types of initial stops in Proto-Min Chinese. Beside plain (unaspirated) and aspirated series he proposes that a third set, which he describes as 'softened', must be posited to account for the correspondences between Min dialects. There are voiced and voiceless members of each of the three series, making a six-way distinction possible at one place of articulation. He does not speculate on the phonetic nature of the 'softened' stops but does suggest at least for the voiced softened series that they "underwent a process of lenition" perhaps because of the influence of some type of voiced segment prefixed to the roots in question. His paper shows that in Amoy the descendants of the earlier tones can be accounted for by splits conditioned only by the difference between voiced and voiceless initials, but in some other dialects there are divergent developments after the softened series. In Kienow for example there is a 42 reflex of original tone 2 (= shang ) and tone 4 (= ru) after the voiced softened series, whereas following the other two voiced series there is a 44 reflex of these same two tones. More interestingly, in Shaowu there is a 55 reflex of tone 1 (= ping) after the voiceless softened series, whereas the other two series of voiceless initials are followed by a 11 reflex of the same tone. Perhaps in this case an original distinction of fortis and lenis stops conditioned a tone split along the same lines as is suggested in this paper for Yoruba, with a higher reflex after lenis stops than is found after fortis ones.

It may also be the case that, in the many cases in which it is found that there are lower tone reflexes after voiceless consonants than after voiced ones if the standard reconstructions are followed, the change can be understood if we see the distinctive feature that separates the series of consonants to be a fortis/lenis one rather than a voiced/voiceless one. In support of this speculation is the fact that many languages of the world, including English, have voiced obstruents which are less 'fortis' in nature than the corresponding voiceless ones [Gimson 1962]. Although the tensity feature in English is subordinate to the voicing feature and does not act to reverse the expected correlation of voicing with lower pitch, in other languages the voicing distinction could well be subordinate, and thus the reverse correlation is explained. The comparison of Yoruba and Cama has shown that the study of the possible effect on tone of an independent feature of tensity is a worthwhile avenue to explore in the realm of consonant effects on tone and possible tone-splitting: fields which remain full of mysteries despite the increased attention devoted to them in recent years.

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